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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/829,714	04/10/2001	Donald Ray Denton	PARK.P0148US	1788

7590 10/27/2003

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EXAMINER	
OCAMPO, MARIANNE S	
ART UNIT	PAPER NUMBER
1723	12

DATE MAILED: 10/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/829,714	DENTON ET AL.	
	Examiner	Art Unit	
	Marianne S. Ocampo	1723	

-- Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 July 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,10,18-20,22,23,25,26,39-46 and 52-65* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,10,18-20,22,23,25,26,39-46 and 52-65* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Previously Indicated Allowable Subject Matter

1. The indicated allowability of claims 46 and 52 are withdrawn in view of the newly discovered references, Verdegan et al. (US 6,422,395B1), Nutter et al. (US 3,505,794), Castellanos et al. (US 6,464,870 B1), Wright et al. (US 3,216,578), Gnamm et al. (US 5,599,449), Durre et al. (US 6,206,205 B1) and Brownell (US 4,464,263). Rejections based on the newly cited references follow.

Claim Objections

2. Claims 44 and 52 are objected to because of the following informalities:

a). In claim 44, the word "same" in line 3 should be changed to "seam".

b). In claim 52, the word "medial" in line 4 should be changed to "media". Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

4. Claims 18 - 19 are rejected under 35 U.S.C. 102(e) as being anticipated by Verdegan et al. (US 6,422,395 B1).

5. Regarding claim 18, Verdegan et al. disclose a filter element comprising:

- a cylindrical filter media (30, 70), and
- an exoskeleton support structure (in the form of an inner support/liner (40) for the filter media (30, 70);
- the filter media (70) being formed from a plurality of layers folded into a plurality of longitudinally extending pleats having radially-inner peaks (at 88, 90) defining an inner diameter, radially-outer peaks defining an outer diameter and sidewalls extending therebetween, and,

• the filter media (70) having a pleat density of at least 5 – 11 pleats per inner diameter inch, which includes some pleat density values in the claimed range of about 8 or more pleats per inner diameter inch, and the height of each pleat being substantially equal to the difference between the outer diameter and the inner diameter, as in figs. 2 – 5 and cols. 2 – 3.

6. With respect to claim 19, Verdegan et al. have disclosed the limitations of claim 18 above. Verdegan et al. disclose the filter media (70) having a pleat density of at least 5 pleats per inner diameter inch, as in claim 5 and col. 3, lines 1 – 5, which would include a pleat density of about 12 or more pleats per inner diameter inch.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1 – 3, 10, 52 - 58 and 64 - 65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Verdegan et al. (US 6,422,395B1) in view of Brownell (US 4,464,263) and Nutter et al. (US 3,505,794).

9. Concerning claims 1, 64 and 65, Verdegan et al. disclose a micro-filter element, capable of removing impurities in the range of about 0.5 μm to about 25.0 μm which includes soot from fuel which could be aviation fuel or hydrocarbon fuel (as in cols. 1 & 4), said element comprising:

- a cylindrical filter media (30, 70), and
- an exoskeleton (in the form of an inner support/liner (40) for the filter media (30, 70); and
- the filter media (70) including a filtration layer (72) sandwiched between inner (82) and outer (80)layers, and
  - the filtration layer (72) being (could be) made of fiberglass (as in lines 54 – 59 of col. 3) and/or at least one polymer (such as PPS (polyphenylene sulfide), aliphatic-aromatic polyamide or polyester, etc., as in lines 44 – 47 of col. 3 & lines 15 – 17 of col. 4);
  - the inner and outer layers (82 & 80, respectively) being made of criss-crossed wires/screen; and
  - the layers (82, 72, 80) of the filter media (70) being folded into a plurality of longitudinally-extending pleats with a density of at least 5 - 11 pleats per inner diameter (76) inch, which includes the claimed range of about 8 or more pleats per inner diameter inch; and

• the exoskeleton (40) comprising a support screen (perforated metal liner) supporting the pleats in an appropriately spaced and non-collapsed condition and the support screen (40) providing at least 50% open flow area so that the filter media (70) is supported, without having (extra) cellulose-fiber and/or woven-mesh endoskeleton support layers, as in cols. 1 – 4 and figs. 1 – 3.

Verdegan et al. fail to disclose the inner and outer layers being made of non-woven polymer and the exoskeleton being bonded to peaks of the pleats and providing a tight array of attachment points

10. Brownell teaches a similar pleated filter element to that of Verdegan et al. comprising a cylindrical filter element/medium (12) and an exoskeleton (16) for the filter element (12), wherein the exoskeleton (16) comprises a support screen (the term "support screen" has been broadly defined to include any perforated and/or woven support sleeve or tube usable for screening particulates, etc. contained in a fluid) bonded to peaks (14) of the pleats to support the pleats in an appropriately spaced and non-collapsed condition, and the support screen (16) providing at least 50% open flow area (with openings 18 shown in fig. 1)and a tight array of attachment points so that the filter element would be sufficiently supported without having cellulose-fiber and/or woven mesh endoskeleton support layers, as in figs. 1 – 2 and cols. 1 – 2.

It is considered obvious to one of ordinary skill in the art at the time of the invention to modify the support screen of Verdegan et al. by substituting it with the embodiment taught by Brownell, in order to provide an alternative and as an effective supporting sleeve/liner for the pleated filter media/element which provides a means for preventing collapse and movement of

the pleats of the filter media, thereby ensuring the same/uniform surface area available for fluid flow at all times (see col. 1 of Brownell).

11. Verdegan et al., as modified by Brownell, fail to teach the inner and outer layers of the filter media being made of non-woven polymer. Nutter et al. teach a similar pleated filter element comprising a cylindrical filter media (38) and an exoskeleton/support screen (50) for the filter media (38), wherein the filter media includes at least one filtration layer (64) sandwiched between inner and outer layers (58 and 56 respectively), the filtration layer (64) being made of fiberglass and the inner and outer layers (58 and 56) being made of non-woven polymer, in the form of non-woven acetate-type membrane/other synthetic fibers, as in cols. 1 – 3 and figs. 2 – 3.

It is considered obvious to one of ordinary skill in the art at the time of the invention to modify the material of construction of the inner and outer layers of the filter media of Verdegan et al., as modified by Brownell, by adding the embodiment taught by Nutter et al., in order to provide a filter element (i.e. composite filter media) which would not corrode (i.e. corrosion-resistant) and also light-weight compared to its metallic counterparts.

12. Regarding claim 2, Verdegan et al., as modified by Brownell and Nutter et al., have taught the limitations of claim 1 above. Verdegan et al. also disclose the layers of the filter media consisting essentially of the filtration layer (72), the inner layer (82) and the outer layer (80), as in figs. 2 – 5.

13. With respect to claim 3, Verdegan et al., as modified by Brownell and Nutter et al., have taught the limitations of claim 2 above. Verdegan et al. further disclose the filtration layer (72) having a thickness of about 0.025 inch to about 0.075 inch, which includes some values in the claimed range of about 0.015 inch to about 0.035 inch, and the inner and outer layers (82 & 80) each having a thickness of about 0.014 inch, as in col. 2, lines 62 – 65 & col. 3, lines 22 – 30.

14. Concerning claim 10, Verdegan et al. disclose a filter element comprising:

- a cylindrical filter media (30, 70) and,
- an exoskeleton support structure (40) surrounding (an inner periphery of) the filter media (30, 70); and
- the filter media being formed of cellulose-fiber free layers including a filtration layer (72 when formed of PPS, polyamides or polyester) sandwiched between inner and outer layers (82 and 80, respectively);
- the layers (82, 72, 80) of the filter media (70) being folded into a plurality of longitudinally extending pleats having radially-inner peaks (at 88, 90) defining an inner diameter, radially-outer peaks (at the opposite end of 88 & 90) defining an outer diameter and side walls extending therebetween, wherein the layers of the filter media (70) consist essentially of the filtration layer (72), the inner layer (82) and the outer layer (80), as in figs. 2 – 5 and cols. 2 – 3.

Verdegan et al. fail to disclose the filter media being also formed of woven-mesh free layers and the exoskeleton support structure being attached to the radially-outer peaks and/or radially-

inner peaks in such a manner that the filter media is sufficiently supported without (additional or extra) cellulose-fiber and/or woven-mesh endoskeleton support layers.

15. Brownell teaches a similar pleated filter element to that of Verdegan et al. comprising a cylindrical filter element/medium (12) being folded into a plurality of longitudinally extending pleats having radially-inner peaks defining an inner diameter, radially-outer peaks defining an outer diameter and sidewalls extending therebetween, and an exoskeleton support structure (16) for the filter element (12), wherein the exoskeleton support structure (16) is bonded/attached to radially-outer peaks (14) of the pleats so that the filter element would be sufficiently supported without having cellulose-fiber and/or woven mesh endoskeleton support layers, as in figs. 1 – 2 and cols. 1 – 2.

It is considered obvious to one of ordinary skill in the art at the time of the invention to modify the support structure of Verdegan et al. by substituting it with the embodiment taught by Brownell, in order to provide an alternative and as an effective support structure for the pleated filter media/element which provides a means for preventing collapse and movement of the pleats of the filter media, thereby ensuring the same/uniform surface area available for fluid flow at all times (see col. 1 of Brownell).

16. Verdegan et al., as modified by Brownell, fail to teach the layers of the filter media being formed also of woven-mesh free layers. Nutter et al. teach a similar pleated filter element comprising a cylindrical filter media (38) and an exoskeleton/support screen (50) for the filter media (38), wherein the filter media being formed of cellulose-fiber free and woven-mesh free

layers, including at least one filtration layer (64) sandwiched between inner and outer layers (58 and 56 respectively), the filtration layer (64) being made of non-woven mat of fiberglass and the inner and outer layers (58 and 56) being made of non-woven polymer, in the form of non-woven acetate-type membrane/other synthetic fibers, as in cols. 1 – 3 and figs. 2 – 3.

It is considered obvious to one of ordinary skill in the art at the time of the invention to modify the material of construction of the layers of the filter media of Verdegan et al., as modified by Brownell, by adding the embodiment taught by Nutter et al., in order to provide a filter element (i.e. composite filter media) which would not corrode (i.e. corrosion-resistant) and physically stable but also light-weight, compared to its cellulose-fiber (i.e. paper) and woven-mesh (usually formed of metallic) counterparts.

17. With respect to claim 53, Verdegan et al., as modified by Brownell and Nutter et al., have taught the limitations of claim 10 above. Verdegan et al. also disclose the filtration layer (72) being made of polyamide, fiberglass or polyester, as in col. 3, lines 45 – 60.

18. Regarding claim 54, Verdegan et al., as modified by Brownell and Nutter et al., have taught the limitations of claim 10 above. Verdegan et al. further disclose the inner and outer layers (82 & 80, respectively) each having a thickness of 0.014 inch, which is less than about 0.030 inches, as in col. 3, lines 22 –30.

19. With regards to claims 55 - 56, Verdegan et al., as modified by Brownell and Nutter et al., have taught the limitations of claim 10 above. Verdegan et al. disclose the layers of the filter media (70) consisting essentially of the filtration layer (72), the inner layer (82), the outer layer (80) wherein the filtration layer (72) is made of either fiberglass, polyamide or polyester, and the inner and outer layers each have a thickness of 0.014 inch, which is less than about 0.030 inches, as in col. 3, lines 22 –30 & 45 – 60 and figs. 2 - 5. As already mentioned in the rejection of claim 10 above, Verdegan et al., as modified by Brownell and Nutter et al., teach the inner and outer layers (those taught by Nutter et al., 58 and 56) being made of non-woven polymer, in the form of non-woven acetate-type membrane/other synthetic fibers, as in cols. 1 – 3 and figs. 2 – 3 of Nutter et al. The same motivation applied in claim 10 above, is being applied here.

20. Concerning claims 57 – 58, Verdegan et al., as modified by Brownell and Nutter et al., have taught the limitations of claims 56 and 10, respectively above. Verdegan et al. further disclose the filter media (70) having a pleat density of at least 5 – 11 pleats per inner diameter inch, as in col. 3, lines 1 – 5.

21. Claims 39 – 40 and 43 - 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Verdegan et al. (395) in view of Durre (US 6,206,205 B1) and Brownell (263).

22. With respect to claims 39 and 46, Verdegan et al. disclose a filter element capable of use as a coalescer element (here, the term "coalescer element" has been broadly defined by the

examiner as any filter element which can perform in removing/filtering water and particulates from fuel (aviation or other kinds of fuel), comprising:

- a cylindrical filter media (30, 70) and,
- an exoskeleton (support screen, 40) surrounding (an inner periphery of) the filter media (30, 70); and
- the cylindrical media (70) comprising a plurality of longitudinally-extending pleats having radially-inward peaks (formed at the inner circumference thereof, at 88, 90) defining an inner diameter, radially-outer peaks defining an outer diameter and sidewalls extending therebetween, and
- the exoskeleton comprising a support screen (40) being disposed adjacent each of the radially-inward peaks of the pleats to support the pleats and providing an open flow area without a (extra or additional) central tube, wherein the support screen (40) comprises a rolled sheet of screen material (perforated liner) having a width (prior to rolling into a cylinder) which could be at least approximately equal to the axial dimension of the filter media (70, 30) and a length approximately equal to the circumferential dimension of the filter media (70, 30), as in figs. 1 - 5 and cols. 1 – 3.

Verdegan et al. fail to disclose the support screen being non-adhesively (i.e. thermally) bonded to the radially-inward peaks of the pleats (claim 46) and/or radially-outer peaks (claim 39) and the sheet of screen material having a seam allowance and lateral edges joined together at a side seam (claims 39 & 46).

23. Durre et al. (205) teach a similar filter element to that of Verdegan et al., comprising a cylindrical filter media (42) and an exoskeleton support structure (45) wherein the cylindrical media (42) comprises a plurality of longitudinally extending pleats (43) having radially-inner peaks defining an inner diameter and radially-outer peaks defining an outer diameter and side walls extending therebetween, and the exoskeleton support structure (45) being formed by a sheet of screen material (40) having a width approximately equal to the axial dimension of the filter media (42) and a length approximately equal to the circumferential dimension of the filter media (42) and a seam allowance (for joining the ends of the sheet together to form the side seam, at 50) and the sheet having lateral edges (46, 48) being joined together at a side seam (50), as in figs. 2 – 3 and cols. 3 - 5.

It is considered obvious to one of ordinary skill in the art at the time of the invention to modify the exoskeleton of Verdegan et al. by adding the embodiment taught by Durre et al., in order to provide an alternative design and improved exoskeleton which would provide sufficient support for the pleats of the filter media at the same time, provide a structure which is less expensive to manufacture (see cols. 3 – 5 of Durre et al.).

24. Verdegan et al., as modified by Durre et al., fail to teach the support screen being non-adhesively (i.e. thermally) bonded to the radially-inward peaks of the pleats (claim 46) and/or radially-outer peaks (claim 39).

25. Brownell teach a similar pleated filter element to that of Verdegan et al., as modified by Durre et al. wherein the filter element of Brownell comprises a cylindrical pleated filter media

(12) which comprises of a plurality of longitudinally extending pleats, and an exoskeleton support structure (16) which has a width approximately equal to the axial dimension of the media and a length approximately equal to the circumferential dimension of the filter media, and the exoskeleton (16) being thermally bonded to each of the radially-outer peaks (14, as in figs. 1 – 2) or each of the radially-inner peaks (14, when the support structure 16 is rolled innermost of the filter media 12) of the pleats of the filter media (12), as in figs. 1 – 2 and cols. 2 – 3 and particularly in col. 3, lines 65 – 67.

It is considered obvious to one of ordinary skill in the art at the time of the invention to modify the filter element of Verdegan et al., as modified by Durre et al., by adding the embodiment of Brownell, in order to provide an improved support structure/exoskeleton for the filter element which would provide a means for preventing collapse and movement of the pleats of the filter media, without the added expense of adhesives at the same time, ensuring the same/uniform surface area available for fluid flow at all times (see col. 1 of Brownell).

26. Regarding claim 40, Verdegan et al., as modified by Durre et al. and Brownell, have taught the limitations of claim 39 above. Verdegan et al., as modified by Durre et al. and Brownell, further teach the side seam (50 of Durre et al.) extending substantially parallel to a longitudinal axis of the filter media (42 of Durre et al.), as in figs. 2 & 6 of Durre et al. The same motivation applied in claim 39 in paragraph 23 above is applied here.

27. With regards to claim 44, Verdegan et al., as modified by Durre et al. and Brownell, have taught the limitations of claim 39 above. Durre et al. also teach the sheet of screen material (40, 45) being a flat sheet of material (which is rectangular in shape in order to form a cylindrical tube later) prior to being bent and the lateral edges (46, 48) being joined together at the side seam, as in cols. 4 - 5. The same motivation applied in claim 39 is applied here.

28. Concerning claim 45, Verdegan et al., as modified by Durre et al. and Brownell, have taught the limitations of claim 39 above. Brownell also teaches the support screen (16) being thermally bonded to each of the radially-outer peaks, as in figs. 1 – 2 and cols. 1 – 4. The same motivation applied in claim 39 in paragraph 25 above is applied here.

29. With regards to claim 43, Verdegan et al., as modified by Durre et al. and Brownell, have taught the limitations of claim 39 above. Brownell teaches the support screen being made of a plastic material such as polyurethane, as in col. 2. Although Verdegan et al., as modified by Durre et al. and Brownell, fail to teach the support screen being made of a PVC coated fiberglass mesh, it is considered obvious to one of ordinary skill in the art to modify the plastic material forming the support screen of Verdegan et al., as modified by Durre et al. and Brownell, from polyurethane to another known type of plastic material such as PVC coated fiberglass, in order to provide an alternative material of construction for the support screen which would be as stable as those formed with polyurethane plastic but only lighter in weight.

30. Claim 41 - 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Verdegan et al., Durre et al. and Brownell, as applied to claim 39 above, and further in view of Gnamm et al. (US 5,599,449).

31. With respect to claim 41, Verdegan et al., as modified by Durre et al. and Brownell, have taught the limitations of claim 39 above. Verdegan et al., as modified by Durre et al. and Brownell, fail to teach the lateral edges of the support screen overlapping and non-adhesively thermally bonded together.

32. Gnamm et al. teach a similar filter element/support screen which can be used as an exoskeleton/support screen for a cylindrical filter media of Verdegan et al. as modified by Durre et al. and Brownell, wherein the element of Gnamm et al. having lateral edges (46, 48) which are overlapped, as in fig. 4 and can be non-adhesively thermally bonded together by the welding method already taught by Durre et al. in claim 39, to form an integral cylindrical support screen, as in cols. 2 – 4 and fig. 4.

It is considered obvious to one of ordinary skill in the art at the time of the invention to modify the support screen of Verdegan et al., as modified by Durre et al. and Brownell, by adding the embodiment taught by Gnamm et al. in order to provide an alternative design for the support screen which ensures positive abutting/joining of the lateral edges of the screen, thereby providing an improved support screen which would not separate at the side seam, thereby preventing leakage and bypassing of fluid through the side seam.

33. Regarding claim 42, Verdegan et al., as modified by Durre et al., Brownell and Gnamm et al., have taught the limitations of claim 41 above. Brownell further teaches the support screen being made of a plastic material such as polyurethane, as in col. 2. Although Verdegan et al., as modified by Durre et al., Brownell and Gnamm et al., fail to teach the support screen being made of a PVC coated fiberglass mesh, it is considered obvious to one of ordinary skill in the art to modify the plastic material forming the support screen of Verdegan et al., as modified by Durre et al., Brownell and Gnamm et al., from polyurethane to another known type of plastic material such as PVC coated fiberglass, in order to provide an alternative material of construction for the support screen which would be as stable as those formed with polyurethane plastic but only lighter in weight.

34. Claim 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over Verdegan et al. in view of Brownell.

35. With respect to claim 52, Verdegan et al. disclose a filter element capable of use as a coalescer element (here, the term "coalescer element" has been broadly defined by the examiner as any filter element which can perform in removing/filtering water and particulates from fuel (aviation or other kinds of fuel), comprising:

- a cylindrical filter media (30, 70) and,

an exoskeleton (support screen, 40) surrounding (an inner periphery of) the filter media (30, 70); and

• the cylindrical media (70) comprising a plurality of longitudinally-extending pleats having radially-inward peaks (formed at the inner circumference thereof, at 88, 90) defining an inner diameter, radially-outer peaks defining an outer diameter and sidewalls extending therebetween, and

• the exoskeleton comprising a support screen (40) being disposed adjacent each of the radially-inward peaks of the pleats to support the pleats and providing an open flow area without a (extra or additional) central tube, wherein the support screen (40) comprises a rolled sheet of screen material (perforated liner) having a width (prior to rolling into a cylinder) which could be at least approximately equal to the axial dimension of the filter media (70, 30) and a length approximately equal to the circumferential dimension of the filter media (70, 30), as in figs. 1 - 5 and cols. 1 – 3.

Verdegan et al. fail to disclose the support screen being non-adhesively (i.e. thermally) bonded to the radially-inward peaks of the pleats and providing at least 50% open flow area and a tight array of attachment points.

36. Brownell teaches a similar pleated filter element to that of Verdegan et al. comprising a cylindrical filter element/medium (12) being folded into a plurality of longitudinally extending pleats having radially-inner peaks defining an inner diameter, radially-outer peaks defining an outer diameter and sidewalls extending therebetween, and an exoskeleton support structure (16) for the filter element (12), wherein the exoskeleton support structure (16) is bonded/attached to radially-inward peaks (14, as in col. 3, lines 65 - 67) of the

pleats so that the filter element would be sufficiently supported without having a central tube, as in figs. 1 – 2 and cols. 1 – 3.

It is considered obvious to one of ordinary skill in the art at the time of the invention to modify the support structure of Verdegan et al. by substituting it with the embodiment taught by Brownell, in order to provide an alternative and as an effective support structure for the pleated filter media/element which provides a means for preventing collapse and movement of the pleats of the filter media, thereby ensuring the same/uniform surface area available for fluid flow at all times (see col. 1 of Brownell).

37. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Verdegan et al., Brownell and Nutter et al., as applied to claim 1 above, and further in view of Kersting (US 4,735,720).

38. Concerning claim 7, Verdegan et al., as modified by Brownell and Nutter et al., have taught the limitations of claim 1 above. Verdegan et al., as modified by Brownell and Nutter et al., also teach the plurality of longitudinally extending pleats include two end pleats joined together at a side seam formed by stitching/sewing together the end pleats, as in fig. 3 and col. 3, lines 18 – 28 of Nutter et al. Verdegan et al., as modified by Brownell and Nutter et al. fail to teach the side seam comprising an adhesive bead which encapsulates all of the layers in distal ends of the end pleats and the adhesive bead extending radially inward between the end pleats.

39. Kersting teaches a similar pleated filter element (1) comprising one or more sheets (layers) of non-woven fibrous filter sheets similar to that of Verdegan et al., as modified by Brownell and Nutter et al., being folded into a plurality of longitudinally extending pleats (3) include two end pleats (5 & 6) joined together at a side seam, and the side seam comprising an adhesive bead (9) encapsulating all of the layers/sheets of filter material in distal ends of the end pleats (5 & 6) and the adhesive bead (9) extending radially inward between the end pleats, as in figs. 1 – 3 and cols. 1 – 3.

It is considered obvious to one of ordinary skill in the art at the time of the invention to modify the side seam of the filter element of Verdegan et al., as modified by Brownell and Nutter et al., in order to provide an alternative design and improved side seam which would not rupture and thereby prevent bypassing of the filter element (i.e. leaking of fluid) through the ruptured side seam (see col. 1 of Kersting).

40. Claims 20, 22 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kersting (720).

41. Concerning claim 20, Kersting discloses a cylindrical filter media (1) comprising:

- a plurality of longitudinally extending pleats (3) and a side seam (9);

- the plurality of pleats including two end pleats (5 & 6), each including a filtration layer, an inner layer and an outer layer (the inner and outer layers being upstream and downstream sheets of a multiple sheet filter media, as in col. 2, lines 24 – 29);

- the two end pleats each having a distal end, a radially-outer peak (at 3), an endmost sidewall extending from the distal end to the radially-outer peak, and a radially inner peak (at 2); the sidewalls being positioned adjacent each other and the distal ends being positioned radially inward relative to the radially-outward/outer peaks; and the side seam (9) comprising an adhesive bead having a continuous mass which encapsulates all of the layers in the distal ends of the end pleats, as in figs. 1 – 3 and cols. 2 – 3. Although the side seam of the prior art (Kersting) in relation to the location of the radially-inner peak being opposite to that of the claimed invention, it is considered obvious to one of ordinary skill in the art to form the side seam such that it is formed extending outward, instead of inward, with respect to the radially-inward peaks, as an alternative and matter of choice design by the manufacturer. The case law, ***In re Japikse***, 86 USPQ 70 (CCPA 1950), has established that a prima facie case of obviousness exists and that the limitation of *having the seams placed in an inverted manner such that the side seam extends outwardly (of the radially-inner peaks), which is opposite that of Kersting (the side seam is extending inwardly)*, is not considered an invention since the applicant is merely shifting the position of *the side seam* to a different position and the operation of the device (i.e. filter element/cylindrical filter media) would not be modified by doing so.

42. Regarding claim 22, Kersting has taught the limitations of claim 20 above, and as a result of shifting the location of the side seam (9) such that it extends outwardly with regards to the radially-inward peaks of the pleats (2), that the adhesive bead forming the side seam (9) would be also extending circumferentially between the radially outward peaks of two end pleats. The same motivation applied in claim 20 above, is applied here.

43. With respect to claim 25, Kersting discloses a cylindrical filter media (1) comprising:

- a plurality of longitudinally-extending pleats (3) and a side seam (9);
- the plurality of pleats including two end pleats (5 & 6), each having a distal end, a radially-outer peak (at 3), an endmost sidewall extending from the distal end to the radially-outer peak, and a radially inner peak (at 2);
- the sidewalls being positioned adjacent each other and the distal ends being positioned radially inward relative to the radially-outward/outer peaks; and
- the side seam (9) comprising an adhesive bead having a continuous mass which extends radially outward between endmost endwalls of the end pleats (5 & 6), as in figs. 1 – 3 and cols. 2 – 3. Although the side seam of the prior art (Kersting) in relation to the location of the radially-inner peak being opposite to that of the claimed invention, it is considered obvious to one of ordinary skill in the art to form the side seam such that it is formed extending outward, instead of inward, with respect to the radially-inward peaks, as an alternative and matter of choice design by the manufacturer. The case law, ***In re Japikse***, 86 USPQ 70 (CCPA 1950), has established that a prima facie case of obviousness exists and that the limitation of *having the*

seams placed in an inverted manner such that the side seam extends outwardly (of the radially-inner peaks), which is opposite that of Kersting (the side seam is extending inwardly), is not considered an invention since the applicant is merely shifting the position of *the side seam* to a different position and the operation of the device (i.e. filter element/cylindrical filter media) would not be modified by doing so.

As a result of shifting the location of the side seam (9) such that it extends outwardly with regards to the radially-inward peaks of the pleats (2), that the adhesive bead forming the side seam (9) would be also extending circumferentially between the radially outward peaks of two end pleats.

44. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kersting in view of Brownell.

45. With regards to claim 23, Kersting has taught the limitations of claim 20 above. Kersting fails to disclose a filter element which further comprises an exoskeleton support structure and the filter media in claim 20 above, the support structure surrounding the filter media and being attached to radially-outward peaks of the pleats.

46. Brownell teaches a filter element comprising a cylindrical pleated filter media (12) having a plurality of longitudinally extending pleats wherein the pleats include radially-outward peaks similar to that of Kersting and further comprising an exoskeleton support structure (16)

surrounding the filter media (12) and being attached to radially-outward peaks (14) of the pleats, as in figs. 1 – 2 and cols. 2 - 3.

It is considered obvious to one of ordinary skill in the art at the time of the invention to modify the filter element of Kersting, by adding the embodiment taught by Brownell, in order to provide an effective support structure for the pleated filter media/element of Kersting which provides a means for preventing collapse and movement of the pleats of the filter media, thereby ensuring the same/uniform surface area available for fluid flow at all times (see col. 1 of Brownell).

47. Claims 4 - 5 rejected under 35 U.S.C. 103(a) as being unpatentable over Verdegan et al., Brownell and Nutter et al., as applied to claim 2 above, and further in view of Wright et al. (US 3,216,578) and Castellanos et al. (US 6,454,870 B1).

48. Concerning claim 4, Verdegan et al., as modified by Brownell and Nutter et al., have taught the limitations of claim 2 above. Verdegan et al., Brownell and Nutter et al., fail to teach the support screen comprising a thermal-bondable mesh having cords which form a grid of approximately about 0. 060 inch to 0.150 inch by 0.060 inch to about 0.150 inch openings which are aligned with a longitudinal axis of the filter media.

49. Wright et al. teach a similar filter element to that of Verdegan et al., as modified by Brownell and Nutter et al., which comprises a cylindrical filter media (5) and an exoskeleton

(either outer screen 2 or inner screen 3) surrounding the filter media (5), wherein the support screen comprises a thermal-bondable mesh (in the form of metallic wire meshes which can be heated and welded/fused with the pleats of the filter media 5, or could be formed of other suitable materials which can include those formed of thermoplastic meshes/screens known in the art) having cords which form a grid of openings which are aligned with the longitudinal axis of the filter media (5), as in fig. 6 and cols. 3 – 4.

It is considered obvious to one of ordinary skill in the art at the time of the invention to modify the support screen (40) of Verdegan et al., as modified by Brownell and Nutter et al., by adding/substituting it with the support screen taught by Wright et al., in order to provide an alternative support screen structure which can support and extend the life of filter elements as such, by providing a structure which would prevent collapse and damage to the pleated filter media due to high pressures and other conditions during filtration (see cols. 1 -3 of Wright et al.).

50. Verdegan et al., as modified by Brownell, Nutter et al. and Wright et al. fail to teach the mesh providing a grid of openings of approximately about 0. 060 inch to 0.150 inch by 0.060 inch to about 0.150 inch openings. Castellanos et al. teach a thermal-bondable mesh for use as a support screen structure (exoskeleton) for a pleated filter media such as the one taught by Verdegan et al., as modified by Brownell, Nutter et al. and Wright et al., formed of extruded plastic or polymer and having cords which form a grid of openings (20) of in the range of 0.1

inch to 0.2 inch by 0.1 inch to 0.2 inch, which includes at least some values in the claimed range mentioned in claim 4, as in col. 3, lines 8 – 14 & figs. 1 & 4.

It is considered obvious to one of ordinary skill in the art at the time of the invention to modify the mesh/support screen of Verdegan et al., as modified by Brownell, Nutter et al. and Wright et al., by adding the embodiment taught by Castellanos et al., in order to provide open flow areas through which continuous flow of unfiltered fluid can flow therethrough, at the same time a thermal-bondable mesh element/support structure which is lightweight and would not corrode compared to its metallic counterparts.

51. With regards to claim 5, Verdegan et al., as modified by Brownell, Nutter et al., Wright et al. and Castellanos et al., have taught the limitations of claim 4 above. Brownell, as mentioned in claim 1 above, has taught the support screen of Brownell being bonded to radially outer peaks of the filter media, as in figs. 1 – 2.

52. Claim 6 rejected under 35 U.S.C. 103(a) as being unpatentable over Verdegan et al., as modified by Brownell, Nutter et al., Wright et al. and Castellanos et al., as applied to claim 4 above, and further in view of Kersting (720).

53. Concerning claim 6, Verdegan et al., as modified by Brownell, Nutter et al., Wright et al. and Castellanos et al., have taught the limitations of claim 4 above.

Verdegan et al., as modified by Brownell and Nutter et al., also teach the plurality of longitudinally extending pleats include two end pleats joined together at a side seam formed by stitching/sewing together the end pleats, as in fig. 3 and col. 3, lines 18 – 28 of Nutter et al. Verdegan et al., as modified by Brownell, Nutter et al., Wright et al. and Castellanos et al.,fail to teach the side seam comprising an adhesive bead which encapsulates all of the layers in distal ends of the end pleats and the adhesive bead extending radially inward between the end pleats.

54. Kersting teaches a similar pleated filter element (1) comprising one or more sheets (layers) of non-woven fibrous filter sheets similar to that of Verdegan et al., as modified by Brownell, Nutter et al., Wright et al. and Castellanos et al., being folded into a plurality of longitudinally extending pleats (3) include two end pleats (5 & 6) joined together at a side seam, and the side seam comprising an adhesive bead (9) encapsulating all of the layers/sheets of filter material in distal ends of the end pleats (5 & 6) and the adhesive bead (9) extending radially inward between the end pleats, as in figs. 1 – 3 and cols. 1 – 3.

It is considered obvious to one of ordinary skill in the art at the time of the invention to modify the side seam of the filter element of Verdegan et al., as modified by Brownell, Nutter et al., Wright et al. and Castellanos et al., in order to provide an alternative design and improved side seam which would not rupture and thereby prevent bypassing of the filter element (i.e. leaking of fluid) through the ruptured side seam (see col. 1 of Kersting).

55. Claims 26 and 59 – 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Verdegan et al. in view of Wright et al. (US 3,216,578) and Brownell.

56. With respect to claim 26,Verdegan et al. disclose a filter element comprising:

- a cylindrical filter media (30, 70) and,
- an exoskeleton support structure (40) surrounding (an inner periphery of) the filter media (30, 70); and
- the cylindrical filter media (70) comprising a plurality of longitudinally-extending pleats having radially-inner peaks defining an inner diameter (at 76), radially-outer peaks defining an outer diameter (at 78) and side walls extending therebetween;
- the exoskeleton support structure (40) comprising a support screen (in the form of a perforated metal liner), as in figs. 2 – 5 and cols. 1 – 3.

Verdegan et al. fail to disclose the support screen of the exoskeleton having a first set of cords extending in a first direction, a second set of cords extending in a second direction and intersecting with the first set of cords and openings defined therebetween, the cords being attached to each of the radially-outer peaks or each of the radially-inner peaks thereby exoskeletonally supporting the pleats in an appropriately spaced and non-collapsed condition; and adjacent cords in the first set being separated from each other by a distance d_1 and adjacent cords in the second set separated by a distance d_2, and adjacent radially-outer peaks being separated from each other by a distance d_{pleat} and the distance d_1 between the first set of cords

being about half to about twice the distance d_{pleat} between adjacent radially-outer peaks and the support screen being non-adhesively attached to the peaks.

57. Wright et al. teach a similar filter element to that of Verdegan et al. wherein the filter element of Wright et al. comprises a cylindrical filter media (1, 5) and an exoskeleton support structure (in the form of either one of screens 2 or 3) for the filter media (1, 5) and the support structure comprising a support screen having a first set of cords extending in a first direction, a second set of cords extending in a second direction and intersecting with the first set of cords and openings defined therebetween, the cords being attached to each of the radially-outer peaks or each of the radially-inner peaks thereby exoskeletonally supporting the pleats in an appropriately spaced and non-collapsed condition; and adjacent cords in the first set being separated from each other by a distance d_1 and adjacent cords in the second set separated by a distance d_2, and adjacent radially-outer peaks being separated from each other by a distance d_{pleat} and the distance d_1 between the first set of cords being about half to about twice the distance d_{pleat} between adjacent radially-outer peaks and the support screen being adhesively attached to the peaks, as in figs. 1 – 7 and cols. 1 - 5.

It is considered obvious to one of ordinary skill in the art at the time of the invention to modify the filter element of Verdegan et al. by substituting the support screen (i.e. 40) of Verdegan et al. in lieu of the support screens structure (i.e. either 2 or 3) of Wright et al., in order to provide an alternative design and improved support structure for the filter media of Verdegan et al., which not only provides a stable and strong support for the pleats such that they would not

collapse under pressure or filtration conditions, but also provide numerous openings for continuous flow towards the filter media (see cols. 1 – 2 of Wright et al).

58. Verdegan et al. as modified by Wright et al., fail to teach the support screen being *non-adhesively* attached to the peaks. Brownell teaches a similar filter element to that of Verdegan et al. comprising a cylindrical filter media (12) having a plurality of longitudinally extending pleats having radially-inner and radially-outer peaks and sidewalls extending therebetween and an exoskeleton support structure (16) which is non-adhesively attached to the radially-outer (as shown in figs. 1 – 2) or radially-inner peaks (if the media is bent into a cylindrical configuration with the support 16 innermost, as in col. 3, lines 65 – 67) of the pleated filter media, as in figs. 1 – 2 and cols. 1 – 3.

It is considered obvious to one of ordinary skill in the art at the time of the invention to modify the material of construction and method of attaching the support screen of Verdegan et al., as modified by Wright et al., by adding the embodiment taught by Brownell, in order to provide an alternative design for the filter element, which provides a plastic support screen which is non-corrosive and more lighter in weight compared to its metallic counterparts, at the same time provide a means for preventing collapse and movement of the pleats of the filter media, thereby ensuring the same/uniform surface area available for fluid flow at all times (see col. 1 of Brownell).

59. Regarding claim 59, Verdegan et al., as modified by Wright et al. and Brownell, have taught the limitations of claim 26 above. Although Verdegan et al., as modified by Wright et al. and Brownell do not teach explicitly the support screen (16) being thermally bonded to the peaks, it is considered well known and obvious to one of ordinary skill in the art that in order to form the liquid plastic, heat or high temperature is utilized to melt the plastic and make it molten or in liquid state, and then this liquid plastic is used in molding the support screen. Furthermore, in molding and expanding the plastic such that it bonds and envelopes the pleats of the filter media, some heat/high temperature is used and maintained until the support screen is formed and then is cured. Claim 59 is an example of a product by process claim. The patentability of a product by process claim is based upon the product itself, eventhough the claim is limited and defined by process (in this instance the thermal bonding of the plastic support screen), and therefore, the product in such a claim is unpatentable if it is the same as, or obvious from the product of the prior art, even if the product of the prior art had been made by a different process. *See **In re Thorpe**, et al., No. 85-1913 (11-21-85) 227 USPQ pages 964 – 966.* The examiner has considered that the filter element having a support screen non-adhesively bonded to the peaks of the pleated filter media, resulting from the combination of teachings of Verdegan et al., Wright et al. and Brownell is the same, if not at least an obvious variation of the claimed invention.

60. With respect to claim 60, Verdegan et al., as modified by Wright et al. and Brownell, have taught the limitations of claim 59 above. Verdegan et al., as modified by Wright et al. and Brownell also teach the support screen which being a mesh (as taught by Wright et al.) being

formed of polyurethane plastic (as taught by Brownell, col. 3), but fail to teach the mesh being made of PVC coated fiberglass. It is considered obvious to one of ordinary skill in the art to modify the plastic material forming the support screen of Verdegan et al., as modified by Wright et al., and Brownell from polyurethane to another known type of plastic material such as PVC coated fiberglass, in order to provide an alternative material of construction for the support screen which would be as stable as those formed with polyurethane plastic but only lighter in weight.

61. Concerning claim 61, Verdegan et al., as modified by Wright et al. and Brownell, have taught the limitations of claim 26 above. Wright et al. further teach the support screen (2 or 3) comprising a sheet of mesh material having lateral edges being joined together at a side seam which extends substantially the length of a longitudinal axis of the filter media, by either spol-welding or soldering, as in cols. 4, lines 69 – 75 and col. 5, lines 1 - 21. The same motivation applied in claim 26 (in paragraph 57) is applied here.

62. Claims 62 – 63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Verdegan et al., Wright et al. and Brownell, as applied to claim 61 above, and further in view of Gnamm et al.(449).

63. Concerning claim 62, Verdegan et al. as modified by Wright et al. and Brownell have taught the limitations of claim 61 above. Verdegan et al. as modified by Wright et al. and

Brownell also teach the lateral edges of the support screen being thermally bonded together by means of welding or soldering, as in cols. 4 – 5 of Wright et al, but fail to teach the lateral edges overlapping.

64. Gnamm et al. teach a similar filter element/support screen which can be used as an exoskeleton/support screen for a cylindrical filter media of Verdegan et al. as modified by Wright et al. and Brownell, wherein the element of Gnamm et al. having lateral edges (46, 48) which are overlapped, as in fig. 4 and can be non-adhesively thermally bonded together by the welding or soldering method already taught by Wright et al. in claim 61 above, to form an integral cylindrical support screen, as in cols. 2 – 4 and fig. 4.

It is considered obvious to one of ordinary skill in the art at the time of the invention to modify the support screen of Verdegan et al., as modified by Wright et al. and Brownell, by adding the embodiment taught by Gnamm et al. in order to provide an alternative design for the support screen which ensures positive abutting/joining of the lateral edges of the screen, thereby providing an improved support screen which would not separate at the side seam, thereby preventing leakage and bypassing of fluid through the side seam.

65. With regards to claim 63, Verdegan et al. as modified by Wright et al. and Brownell, have taught the limitations of claim 62 above. Verdegan et al., as modified by Wright et al. and Brownell also teach the support screen which being a mesh (as taught by Wright et al.) being formed of polyurethane plastic (as taught by Brownell, col. 3), but fail to teach the mesh being made of PVC coated fiberglass. It is considered obvious to one of ordinary skill in the art to

modify the plastic material forming the support screen of Verdegan et al., as modified by Wright et al., and Brownell from polyurethane to another known type of plastic material such as PVC coated fiberglass, in order to provide an alternative material of construction for the support screen which would be as stable as those formed with polyurethane plastic but only lighter in weight.

Response to Arguments and Amendments

66. Applicant's arguments with respect to claims 1 – 7, 10, 18 - 20, 25 - 26, 39 - 46 and 52 - 65 have been considered but are moot in view of the new grounds of rejections set forth above. **This action is non-final.**

Conclusion

67. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patent 6,332,987 B1 (Whitney et al.) and US Patent Application Publication 2003/0085165 A1 (Shane).

68. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marianne S. Ocampo whose telephone number is (703) 305-1039. The examiner can normally be reached on Mondays to Fridays from 8:30 A.M. to 4:30 P.M..

69. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda Walker can be reached on (703) 308-0457. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

70. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

M.S.O.

JOSEPH DRODGE
PRIMARY EXAMINER